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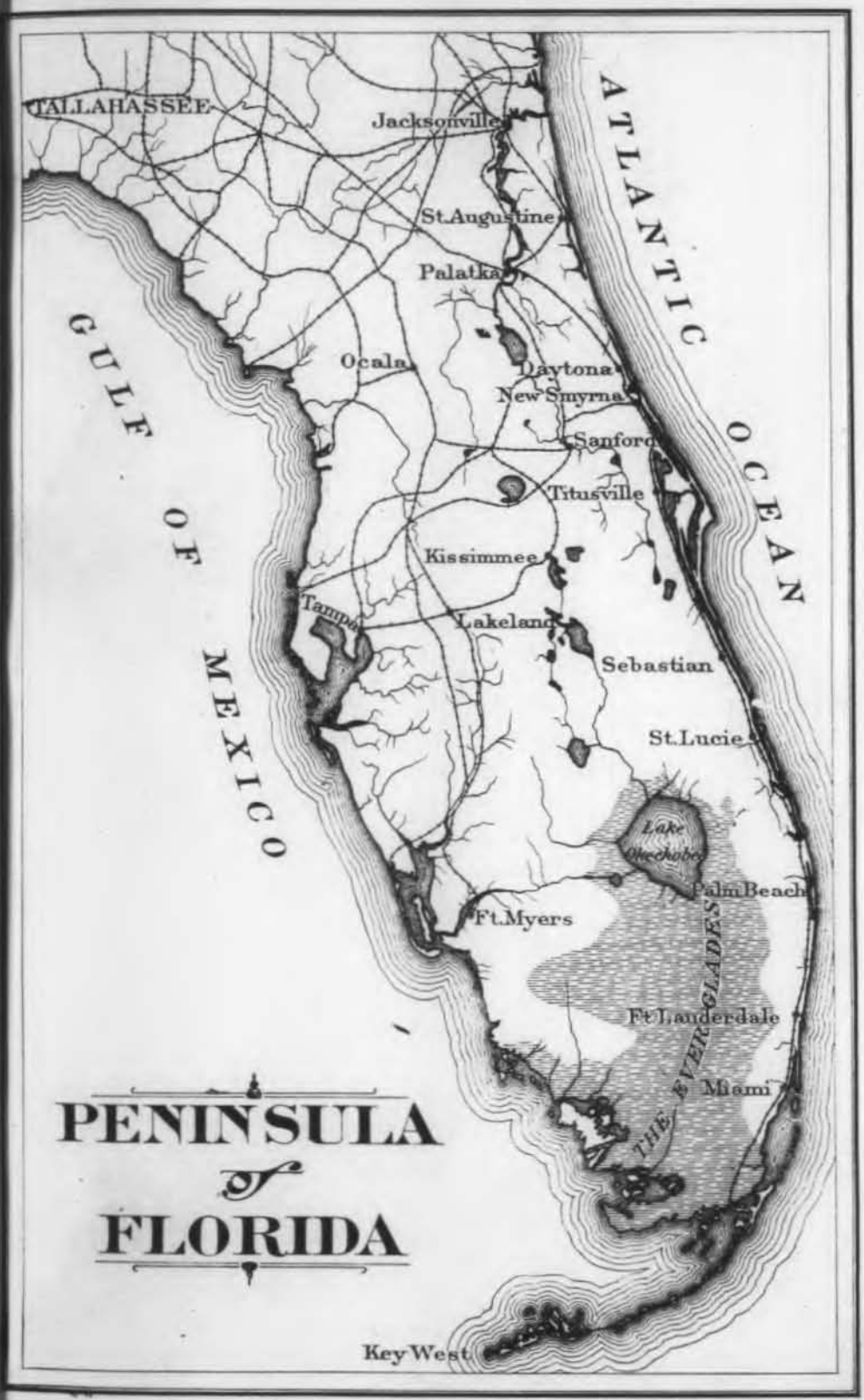
The Florida Everglades

By J. O. WRIGHT

THE EVERGLADES

of FLORIDA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THE EVERGLADES
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THE EVERGLADES
of FLORIDA

THEIR ADAPTABILITY FOR THE GROWTH OF SUGAR CANE

PART ONE

A BRIEF DESCRIPTION OF THE EVERGLADES AND THEIR PRESENT CONDITION.

PART TWO

A DISCUSSION OF THE SOIL AND CLIMATIC CONDITIONS NECESSARY FOR THE GROWTH OF SUGAR CANE, METHODS AND COST OF CULTIVATING, HARVESTING AND MANUFACTURING THE SAME.

BY

J. O. WRIGHT

FORMERLY SUPERVISING DRAINAGE ENGINEER IN THE UNITED STATES DEPARTMENT OF AGRICULTURE AND LATER CHIEF DRAINAGE ENGINEER FOR THE STATE OF FLORIDA.

TALLAHASSEE, FLA.

DECEMBER

1912

THE way to develop a country is to grow and manufacture within its borders the necessities its people must have in their daily life.

CONTENTS.

LIST OF ILLUSTRATIONS

INTRODUCTION.

My first public utterance concerning the Everglades of Florida was an address delivered in Miami, Fla., Feb. 26, 1908. At this meeting I gave it as my opinion the Everglades would be drained, but the land would not be permanently settled without the introduction and growth of some staple crop of a high commercial value, and suggested rice and sugar cane as the crops that would most likely be found best suited to the climate and soil.

After having completed my investigation for the U. S. Department of Agriculture, in a report prepared by me June 25, 1909, I used the following language:

"It is believed by agriculturists and chemists who have studied the situation, and from evidence afforded by the demonstrations that have been made, that sugar cane can be grown successfully on these muck lands. The writer saw in numerous places, visited many patches of sugar cane, the stalks as large and heavy as those grown in Louisiana and thick enough on the ground to yield a big tonnage per acre.

"It requires much capital to grow and manufacture sugar cane profitably. Owners of small areas cannot engage successfully in this work unless modern central factories are provided, to convert the cane into sugar. Another serious drawback is harvesting the cane and transporting it to the factory. Owing to the soft condition of the ground this will have to be done by means of tram-roads and cars or canals and barges.

"If adequate facilities for handling the crop economically were provided, there seems to be but little doubt in the minds of those who have given the matter careful consideration that sugar cane is THE staple crop that can be grown safely and profitably in the Everglades.

"The amount of sugar produced in the United States has but little influence on the price, as we are compelled to import large quantities from other countries to supply our needs. At the present time the price of sugar is high enough to make the growing of cane a profitable business. In Louisiana the price of cane at the mill is about $3.00 per ton, varying somewhat with the price of sugar.

"Although cane is an expensive crop to grow, a yield of thirty tons per acre, which is not at all uncommon, would show a profit much greater than can be secured from any field crop in the Mississippi Valley.

"There may be other staple field crops that can be grown successfully on these muck lands, but the fact has not yet been demonstrated. At the present time sugar cane seems to be the most promising crop that can be raised extensively on these lands. It is true that many other crops may be grown, but they are of a perishable nature, the demand for them is limited, and the cost of transportation so great that to undertake their production on a large scale does not seem warranted."

The object of this publication is to set forth my views somewhat at length, after a more thorough and systematic study of this subject. The facts stated in support of my arguments are all well authenticated, and the conclusions reached conservative and reasonable.

Tallahassee, Fla., Dec. 1, 1912. J. O. WRIGHT.

PART ONE.

PART ONE.

A BRIEF DESCRIPTION OF THE NATURAL FEATURES OF THE EVERGLADES AND THEIR PRESENT CONDITION.

THERE are but few persons in the United States who have not heard of the Everglades of Florida, yet a large per cent of those who have not SEEN the Everglades have an erroneous and imperfect conception of this territory. The general impression is that the Everglades is an impenetrable swamp or jungle covered with a dense growth of trees and vines, infected with all kinds of reptiles, and reeking with fever and malaria.

During the past three years the writer has had an opportunity of meeting a great many persons from different parts of the country, on their first visit to this famous territory. With hardly a single exception they were filled with surprise and admiration. Instead of an impenetrable swamp, covered with timber, they found a vast PRAIRIE sixty miles wide, stretching from Lake Okeechobee on the north to Biscayne Bay on the south.

Between the Everglades and the Atlantic Ocean is a belt of small timber, whose general surface is one to three feet higher than the Everglades directly west, and having a slight slope toward the south. This strip of land is composed of sand, loam and clay, with some muck in the low places, the entire area being

underlain with an oolitic limestone. The depth of earth on this limestone ranges from twelve feet or more at the north end, to a mere covering at the south end. Near the coast a series of flat ridges of sand have been thrown up by the action of the wind and waves, two to ten feet higher than the general level. The growth in this belt is scattering pine and scrub palmetto, on the sandy portions, and small cypress in the sloughs. There is a similar strip of high land, though much wider, on the west side of the Everglades, having a slope toward the south and west.

The soil between these two ridges is a well decomposed "muck" (not peat) two to fourteen feet deep. This muck is underlain with a porous rotten limestone mixed in many places with sand, clay, shell and marl.

As a general proposition, the muck is deepest near Lake Okeechobee, and shallowest in the southern portion of the Everglades. For a distance of about twenty miles south from Lake Okeechobee, the underlying material is practically level on top. Beyond this it becomes uneven, being marked with irregular depressions and ridges. As the surface is level, this unevenness of the sub-stratum causes a varying depth of muck within a limited area.

The surface of the Everglades, taken as a whole, appears to be a level plain, having a slope of three inches per mile toward the south and east, yet this general statement is subject to slight modification. Throughout the entire area there are numerous winding shallow depressions or channels 100 to 500 feet wide, and

one to three feet lower than the land through which they pass. These depressions, locally called "Strands," wind through the 'Glades in all directions, though their general trend is from north to south. In other places there are slight depressions, like ponds or lagoons, covering one to forty acres. These are most numerous along the eastern margin and throughout the southern portion. The muck in these depressions is usually less firm than the land on either side. These irregularities of the surface also affect the depth of muck at these points, as the underlying hard material is no lower in these surface depressions than under the adjacent land. These low places are usually filled with water, while the general surface of the Everglades is comparatively dry.

Early Description of the Everglades.

The following description of the Everglades was written in 1848, by Col. S. H. Long, Topographical Engineer of the U. S. Army, and transmitted to Hon. J. D. Wescott, Jr., U. S. Senator from Florida. It presents very clearly the condition at that time, and the opinion that was held as to the future possibilities of the Everglades.

"The main body of this district appears to be situated between 25 degrees 31 minutes and 27 degrees of north latitude, and between 80 degrees 30 minutes and 81 degrees 15 minutes of west longitude from Greenwich. Its extent from north to south is about 100 miles, and its average width from east to west about 50 miles.

It is bounded on the north by Lake Okeechobee, which may be regarded as an extensive water sheet covering a portion of the Everglades and holding it in a state of constant submersion, and on the east, south and west by a sort of rim or margin, elevated a few feet above the common level of the included district and of the circumjacent country. A profusion of insular tracts of greater or less extent, and of elevations about equal to that of the rim, or a few feet above the common level of the district, are scattered in every direction over the surface of the district.

"With the exception of these insulated tracts and the rim with which it is bounded, the entire district is subject to periodical overflows of water to the depth of two or four feet during the rainy season, which usually prevails from August or September to February or March of every year. These overflows are supposed to have their principal origin in the country northward of Lake Okeechobee and to be brought down to the lake through the channel and valley of the Kissimmee River.

"The entire district embraces an area of about 5,000 square miles, nearly one-half of which, agreeably to the best information I can obtain, is susceptible of drainage, and, when thus reclaimed, would present fields of vast magnitude adapted to the cultivation of sugar, rice, and numerous tropical products of great value. The method of drainage that has been proposed and recommended is as follows, viz:

"First—A spacious canal or drain leading

from Lake Okeechobee westward, through the valley or pass of Caloosahatchee River to the Gulf of Mexico;

"Second—A similar canal leading from the same lake eastward, through the valley of Lochahatchee River to the Atlantic Ocean; and

"Third—Numerous drains of much smaller size leading across the rim and communicating, respectively, with one or more of the numerous rivulets that rise in the vicinity of the rim and empty into the Gulf of Mexico and Atlantic at various points along the coast of Florida.

"It is believed by many that the two large canals first mentioned will amply subserve the purpose of drainage; but, should they prove inadequate, that the desired end may be effectually attained by means of the smaller drains mentioned in the third proposition.

"The practicability of draining the Everglades must, of course, depend on the elevation of Lake Okeechobee, and of the Everglades themselves, above the level of the high tides in the ocean. This elevation is supposed to be from twelve to twenty feet. The difference of the levels alluded to, so far as I can learn, has never been determined by instrumental surveys. Its accurate determination should unquestionably precede any attempts to accomplish the object in view.

"By means of the two canals connecting Lake Okeechobee with tidewater, together with a lock in each (if necessary) of suitable dimensions to admit small coasters and steamers, it is supposed that a line of continuous navigation may

be opened entirely across the Isthmus of Florida from the Atlantic to the Gulf of Mexico. In case the locks should be found expedient and proper, they should be accompanied by spacious waste weirs or sluices and perhaps flood-gates, in order to afford a full and free discharge of water from the lake," etc.

Formation of the Everglades.

The southern part of the Peninsula of Florida was at one time covered with water, which receded and left the rock ridges on either side of what is now the Everglades exposed. The basin between these ridges has been gradually filled by accretions and the growth of vegetable matter. There are no indications of an upheaval or of volcanic action in South Florida. Neither is there any indication that the rock underlying the muck is of coral formation, except in very limited areas. It is not stratified, but is homogeneous in character. In most places it is soft and porous, but there are, however, certain limited areas in which it is very hard and difficult to remove. When in place, this stone is quite retentive of moisture, but dries out and hardens when it is exposed to the air, and makes good concrete and surface dressing for roads.

The most important factor connected with the formation and reclamation of the Everglades is Lake Okeechobee, the largest body of fresh water, except Lake Michigan, wholly within the United States. This lake is almost circular in shape, covers a half million acres, and has an average depth of thirteen feet. It lies at the

northern end of the Everglades, and has a mean surface elevation of 20.6 feet above sea level. It is not fed by springs or subterranean channels, but derives its supply of water from the run-off from the flat pine lands lying to the north and west. The area draining into Lake Okeechobee is seven and one-half times as large as the lake itself. This, with the surface of the lake, gives a catchment area of 4,000,000 acres to furnish the supply of water for the lake. Until recently Okeechobee had no well-defined outlet, but canals have now been dug, connecting it with the sea. It has low, marshy banks on the south and west, and during the rainy season (June to October), after filling to an elevation of 21.6 feet, about one foot above normal, it overflows its banks in the lowest places for a distance of seventy miles, and the surplus water passes off over the land, finally reaching natural channels through which it is discharged into the Gulf of Mexico or the Atlantic Ocean. It is this annual overflow from the lake, flooding the deposit of muck lying between the ridges of highland, that has formed the "Everglades."

If a water-tight dam were built across the Peninsula of Florida at the south end of Lake Okeechobee, so as to cut off all the water from the lake, there would be no Everglades. The surface water would soon evaporate and the pools dry up. The muck would become parched, and the water-loving plants that now cover the surface would die from lack of moisture, and the area would become a barren plain. Like the arid lands of the West, it "would cry for water."

Natural Drainage.

During this formative period, water that was discharged by the Kissimmee River into Lake Okeechobee, while endeavoring to find an outlet to the sea, broke through the rock rim in many places, both on the east and west coast, and by its constant action eroded the rock, so that there are numerous channels through which the surface water flows quite freely from the Everglades, both into the Atlantic Ocean and the Gulf of Mexico. In many places these channels are worn down several feet, but do not extend far beyond the rim into the interior. The water is brought from the margin of the 'Glades in small rivulets to the heads of these streams, which increase in size as they approach their outlets. The difference in elevation between sea level and the source of these streams gives many of them sufficient fall to cut out large and deep channels. The streams on the east coast, beginning at Rockledge and going south, are as follows:

Sebastian River, St. Lucie River, Loxahatchee River, Hillsboro River, Cypress Creek, Middle River, New River, Snake Creek, Arch Creek, Little River, Miami River and Snapper Creek. These streams are shorter, and have more fall per mile than those on the west coast. None of these were originally connected directly with Lake Okeechobee, although they receive more or less water from it during the period of heavy rains. On the west coast the conditions are somewhat different.

The Caloosahatchee River, a stream of consid-

erable importance, now takes its water directly from Lake Okeechobee and the adjacent country on the west, and flows southwest to Fort Myers.

Natural Growth and Vegetation.

Along the south shore of Lake Okeechobee there is a strip of land, one-half to two miles wide, covered with a dense growth of "Custard Apple," a dwarfed, gnarled tree, twenty to thirty feet high and eight to twelve inches in diameter. The wood of this tree is hard, but decays quickly when cut down, while the roots are very soft, almost as light as cork when dry, and are easily removed from the soil. Along the edges of this custard apple there are clumps of willow, elder and other soft shrubs. This entire fringe of timber and bushes is covered with a wild morning glory, giving the whole a picturesque appearance.

Along the eastern margin of the Everglades there is a growth of small cypress, scattering pine, myrtle and willow. The line between the sandy land and the muck is not well defined. It is difficult to tell just where the upland ceases and the muck begins. In some places the clumps of small trees and underbrush extend three to five miles from the rock rim into the open prairie, while in others the open prairie terminates in a well-defined line next to the rock rim. The combined area of these strips of timber and clumps of bushes is less than one per cent of the entire area of the Everglades.

The depressions and ponds above described,

probably aggregating five per cent of the entire area, are covered with a growth of lily-pads and other aquatic plants. The remainder is covered with a dense growth of coarse grass, four to eight feet high, which, from the structure of its blades, is called "Saw Grass." The stem of this grass is quite coarse, the blade is tough, with a serrated edge, and the plant is unfit for forage or any other use. When the land is once broken and this saw grass destroyed, it does not reproduce itself, but the ground is soon covered with a growth of coarse weeds, principally with what is called "Careless Weed." The writer has seen careless weeds along the canal banks, twenty inches in circumference at the ground and sixteen feet high—the growth of one season.

Ownership and Control.

As but few persons outside of the State of Florida are familiar with the method of handling the swamp and overflowed lands, a brief description of the ownership and control of these lands may be useful.

By the treaty of 1819, Spain ceded to the United States the territory then known as East and West Florida. This territory was by Act of Congress, approved March 3, 1845, admitted into the union under the name of the State of Florida.

The Federal Government, in 1850, by what is commonly known as the "Swamp Land Grant," ceded to the several States for the purpose of drainage and reclamation, all the swamp and

overflowed land within their respective borders, remaining unsold at the time. By this act Florida acquired title to all the swamp and overflowed lands within her borders, amounting to upwards of twenty million acres.

Patents or deeds for these lands have been issued by the Federal Government to the several States, from time to time. Patent No. 137, known as the Everglades, embracing 2,862,080 acres, was issued April 29, 1903. The Legislature of the State, in 1851, passed an Act accepting the swamp and overflowed lands ceded to it by the Federal Government, and made provision for a Board of Internal Improvement, composed of members from the several judicial circuits of the State, to take charge of these swamp lands. This Board was unable to discharge its duty and recommended a new bill, which became a law June 6, 1855. (See Chapter 610, Laws of Florida). This Act creates a Board of Trustees of the Internal Improvement Fund by designating the Governor, Comptroller, Treasurer, Attorney-General and Commissioner of Agriculture, and their successors in office, as Trustees, and grants to said Trustees irrevocably the lands granted to the State of Florida by the Act of 1841, for internal improvement purposes, remaining unsold, and also the lands granted to the State of Florida under the Act approved September 28, 1850, for the purpose and trust therein set forth, the main trust being the drainage and reclamation of the overflowed lands.

The personnel of the Board of Trustees of the Internal Improvement Fund, which has control of the public lands, has been frequently changed

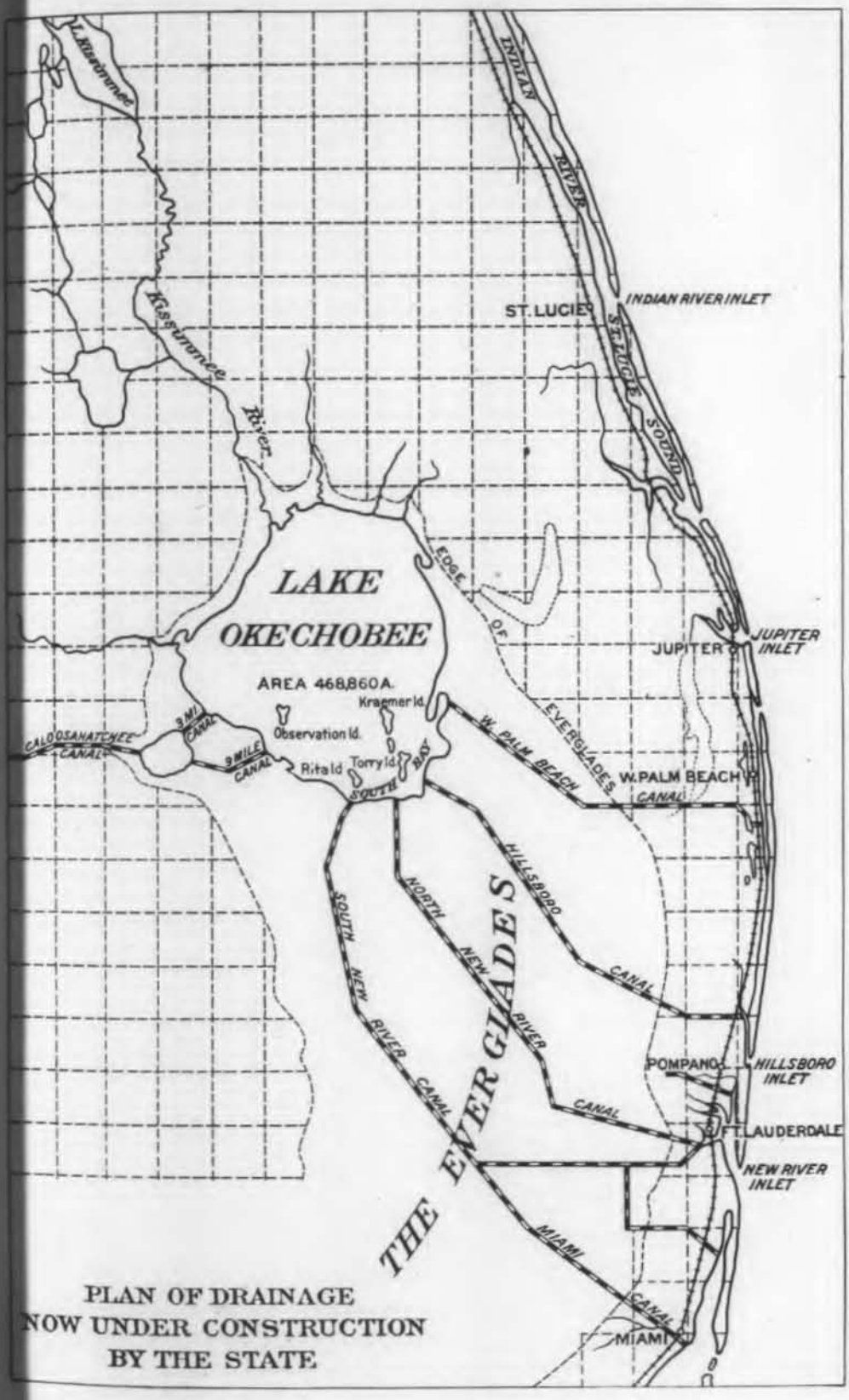
by the election of new State officers. These frequent changes have been detrimental to the formation and carrying out of any fixed policy concerning the drainage of the swamp lands. It has generally been the belief of the Trustees that they should be drained, but how or by whom has been an open question.

In February, 1881, the Trustees entered into a contract with Hamilton Disston, of Philadelphia, Pa., to drain and reclaim several million acres of land in South Florida in which were included the Everglades. He entered upon the undertaking, and considerable work was done in Osceola County, near Kissimmee, and in the Caloosahatchee River valley, between Fort Thompson and Lake Okeechobee. The work contemplated was never completed, and very little permanent good was accomplished. The Disston contract was terminated in 1893. No other drainage was undertaken by the Trustees until 1907, when the work now being carried on was inaugurated.

The Plan of Drainage Adopted by the State.

The foregoing statements explain why Lake Okeechobee is the dominant feature in any rational plan for the reclamation of the Everglades. Without Lake Okeechobee the Everglades would never have been formed, and without it the Everglades can never be reclaimed and made productive.

Any intelligent person, familiar with the natural conditions, will recognize at once that the first step in any plan of reclamation is the con-



PLAN OF DRAINAGE
NOW UNDER CONSTRUCTION
BY THE STATE

trol of the flood waters from Lake Okeechobee. To accomplish this the Trustees have undertaken to cut enough canals from the lake to tide-water to permanently lower the level of the lake to an elevation of sixteen feet above sea level. No one knows certainly just how many canals of given capacity will be required to do this.

The Trustees have already completed a canal sixty feet wide and eight feet deep from the west side of the lake to the channel of the Caloosahatchee River at Fort Thompson, and have let a contract, which is now seventy per cent completed, for three canals fifty feet wide and ten feet deep from the south end of the lake to the Atlantic Ocean. These three canals will be finished some time during the year 1913. Another canal eighty feet wide and ten feet deep is projected from the east side of the lake to tide-water at West Palm Beach. This canal will no doubt be completed within the next two years. These five canals leading from the lake, having a combined width of 290 feet and a depth of flow of eight feet, when the lake is bank-full, will, in the judgment of the writer, be sufficient to control the overflow from the lake.

In addition to the discharge capacity of these five canals during the rainy season, the plan adopted by the Trustees contemplates lowering the level of the lake to sixteen feet above sea level at the beginning of the rainy period, and allowing it to fill to nineteen or twenty feet at the close of the season. The object of this storage is two-fold:

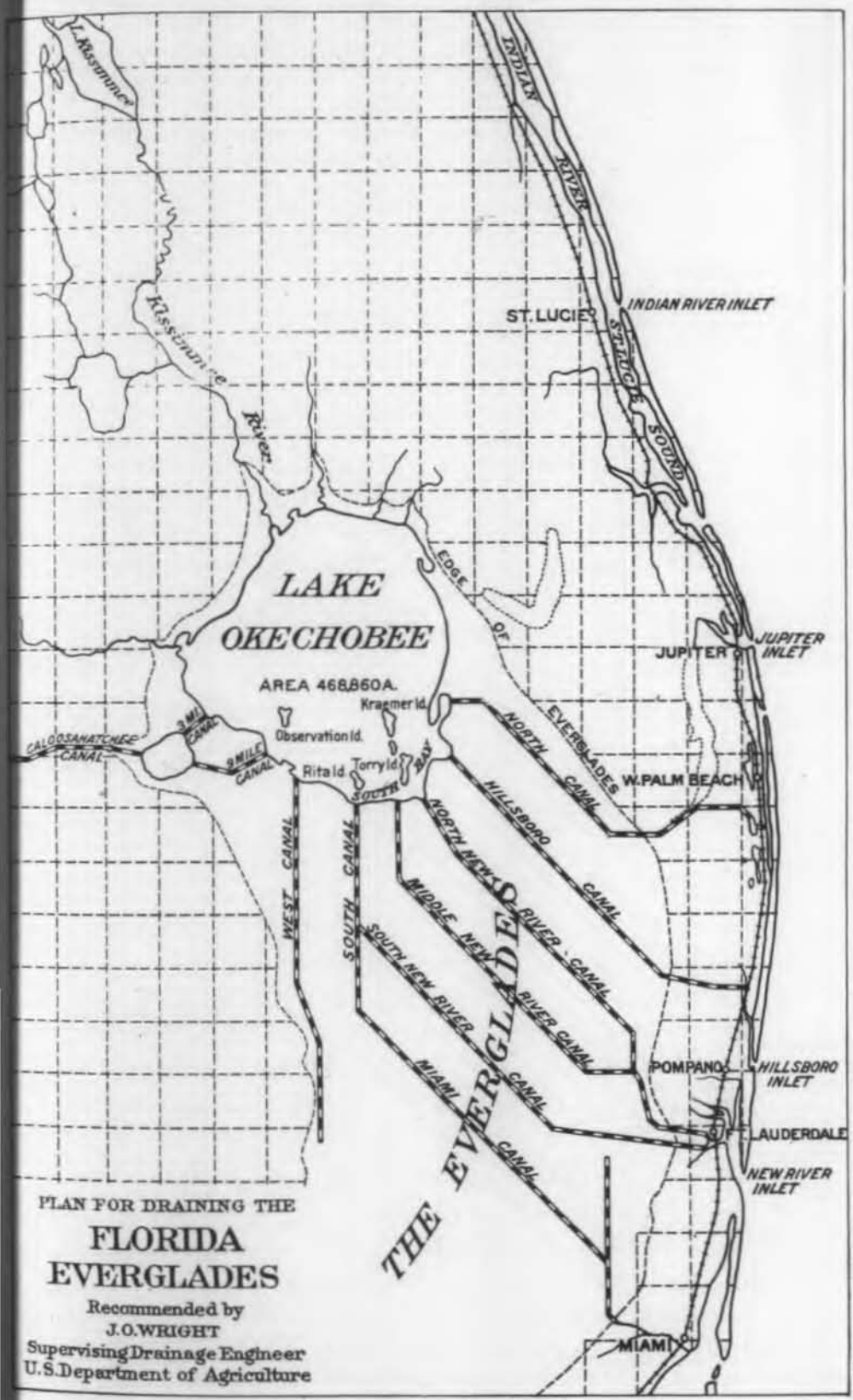
1. To lessen the number of canals that would be necessary to discharge this run-off during the short period in which it is accumulating.

2. To hold an adequate supply of water in the lake for irrigation, if needed, and to maintain a uniform flow in the canals throughout the year.

For this purpose concrete locks and dams are to be built in each canal near the shore of the lake. These dams are provided with sluice gates, by means of which the quantity of water flowing from the lake into the canals is at all times under the control of the lock-tender. There is probably no other place in the world where the conditions are so favorable for both irrigation and drainage as in this project.

By lowering the level of the lake a storage capacity, having an area as large as the State of Rhode Island, and three or four feet deep, is formed. This will provide an inexhaustible supply for irrigation and assist in maintaining a sufficient depth of flow in the canals throughout the year to afford navigation for shallow-draft boats and barges. There are skeptics, and so-called "engineers," who claim this cannot be done, but those who have given this matter the most careful consideration maintain that, by the construction of suitable locks and dams, with sluice gates at proper intervals in the canals, it is a simple and inexpensive matter. By opening or closing the gates the stage of water, within certain limits, in any portion of the canals, may be successfully regulated.

When these five canals are completed, should it be found that their discharge is not sufficient



PLAN FOR DRAINING THE

FLORIDA EVERGLADES

Recommended by
J.O. WRIGHT
Supervising Drainage Engineer
U.S. Department of Agriculture

to control the level of the water in the lake, others can be constructed, and the money so far expended will not have been wasted. This is a much wiser method of procedure than to have constructed six or seven canals and find that only five were required to do the work.

Lateral Canals.

The next step in any plan of reclamation is to provide means for promptly removing the excess of water that falls directly on the Everglades. This can be done on practically all the area by gravity drainage. In the southern part some of the ponds and depressions may be so low as to require pumping, but these are very small and the land of doubtful value when drained. Just how much local precipitation will have to be removed from this area by drainage is another matter about which engineers do not agree, since no other body of land like the Everglades has been reclaimed. Results obtained by actual experience are lacking. Conclusions based solely on theory are often disappointing, so experience must be the final arbiter in determining the quantity that must be removed.

The main arteries now being built for controlling the overflow from the lake increase in width at stated intervals, so that their combined discharge capacity at their outlets is much greater than at the lake end. In a plan of drainage prepared by the writer (see Senate Document No. 89, pages 168 to 171), eight canals, having a discharge capacity at their out

lets two and one-third times their capacity near the lake, were recommended as main arteries. The arrangement shown on this plan is not being strictly carried out by the Trustees, but the exact location of these canals is not a matter of vital importance so long as the requisite discharge capacity is provided.

There is no difficulty whatever in completely draining the Everglades when the overflow from Lake Okeechobee is cut off; it is simply a matter of digging enough canals and laterals to remove the rainfall as rapidly as it accumulates. The material is soft, free from trees and roots, and is easily handled with a steam dredge or ditching machine.

Low Cost of Work.

There is probably not another large body of land in the United States that can be drained and put in cultivation as cheaply as the Everglades. The main arteries or outlets to serve the entire area will not cost to exceed $2.00 per acre. The cost of laterals and farm drains will depend largely upon the purpose for which the land is to be used. For general farming this will be from $3.00 to $5.00 per acre. If the land is to be used for intensive farming, and a complete system of canals and ditches for both drainage and irrigation are provided, the cost will not exceed $10.00 per acre. The difference between the cost of reclaiming this land and the reclamation work in the arid west is simply astounding. In a report published by the De-

partment of Commerce and Labor December 1, 1910, it is stated the Federal Government has approved thirty reclamation projects having an area of 3,029,951 acres at an estimated cost of $119,555,555.00, or approximately $40.00 per acre.

When land in the Everglades is drained there is no grubbing or clearing to be done before it can be put in cultivation. The low cost of complete drainage and irrigation, the absence of clearing and grubbing, and the favorable climatic conditions, are facts that must be taken into consideration by prospective purchasers in comparing the value of this land with other lands on the market.

Persons who claim the Everglades cannot be drained are ignorant of the natural conditions or wilfully misrepresent them. The fact that the State has been working on this project for five years and the land is not yet drained does not indicate failure or impossibility. The Panama Canal was commenced before the drainage of the Everglades, but no ships have yet passed through this canal. If a farmer should buy land on a projected railroad and grow crops, he could not reasonably expect to ship his products on this line of road before the grade was completed and the ties and rails laid. The fact that trains were not running would be no indication that the road could not be built. Because the land in the Everglades cannot be occupied and farmed at the present time does not signify it cannot be reclaimed. The beneficial results of the work now under contract and pro-

jected cannot be realized until the canals are completed.

A piece of unfinished work often makes the natural conditions worse than they were before the work was commenced. An unimproved street, when ploughed up and partially graded, is frequently worse than it was before the improvement was begun. This is particularly true of this project at the present time. The unfinished canals concentrated the overflow from the lake during the past rainy season and flooded the lower part of the Everglades west of Fort Lauderdale. This has caused the opponents of this work to reiterate the old falsehood—"The Everglades cannot be drained." They cite the overflow as an illustration that the work is a failure. Such statements are the result of an ignorance too dense to be overcome, or else are made with a sinister motive.

Present Condition.

At this point I wish to emphasize the fact that no part of the Everglades is yet sufficiently drained for occupancy and cultivation. This is because the main arteries for controlling the overflow from Lake Okeechobee are not complete. Attempts have been made, although the land is imperfectly drained and subject to overflow each year, to cultivate limited areas adjacent the canals and on the south shore of the lake. Some of these attempts have been successful, while others have been failures.

From the present rate of progress it now

seems that the drainage work will be sufficiently advanced by December 1, 1913, to cultivate with safety and profit much of the higher land immediately south of Okeechobee. It will, however, be necessary to dig additional outlets, and put in a complete system of laterals, before the Everglades as a whole can be put in cultivation. No arrangement has yet been made for doing this work.

More than one-half of the muck land in the Everglades has been sold by the Trustees of the Internal Improvement Fund to private parties, without any stipulation or agreement as to lateral drains. Much of this land has since been resold, and is now held in small tracts (ten to forty acres), by persons scattered throughout the United States. This is an unfortunate condition confronting the owners of Everglade land that must be met and overcome.

So far as the records show, the Trustese have not officially adopted any policy concerning lateral ditches. In certain instances, in which they have sold large areas of Everglade land, they have agreed with the purchasers to expend seventy-five per cent of the purchase money, in the construction of certain canals, which are now under contract and will soon be completed. In no instance do the records show that the Trustees have promised or agreed to drain any particular part of the Everglades. The canals now being constructed are an essential part of any drainage plan, and must be completed before a system of laterals can be provided.

Obligation of the State.

When the swamp and overflowed land was ceded to the several States by the Federal Government the following condition was imposed by the Act: "The proceeds of said land, whether from sale or direct appropriation in kind, shall be applied exclusively, as far as necessary, to reclaiming said land by means of levees and drains." (Rev. Stat., Sect. 2480.)

It is quite evident from this statute that Congress intended to place, and did place, the burden of draining this land on the land itself, and not on some other person or property. It was never contemplated by Congress, or by the States accepting the land, that it would ever be drained by the Federal Government, or at the expense of the State, other than in the manner set forth in the act itself. The burden of drainage is still on this land, and it cannot be shifted by change in ownership.

In the case of Kimball vs. the Reclamation Fund Commissioner (43 Cal. 344), the Supreme Court of that State said: "In accepting this grant the State was bound to carry out in good faith the objects for which it was made. It would practically defeat the whole cause of reclamation contemplated by Congress if the mere sale of land to private proprietors should have the effect to exempt it from the power of the Legislature to reclaim it. Such a result would be a flagrant violation of its duty toward the Federal Government."

In order to discharge this obligation, the State of Florida has provided two ways for raising

funds for carrying on the work: First—the Legislature, in 1907, created a Special Drainage District embracing the Everglades and some contiguous territory, containing approximately 4,300,000 acres, and levied a drainage tax of five cents per acre, per annum on all the lands in the district for the purpose of draining the land; second—it has seventy-five per cent of the money received from the sale of swamp and overflowed lands for the purpose of drainage. These are the only sources of revenue the State has for carrying on the drainage work in the Everglades.

From the first of these sources (the drainage tax) a fund of about $150,000 per annum is collected—the Trustees owning about 1,300,000 acres in the drainage district on which no assessment is made. This tax has been levied and collected each year since 1907.

The amount raised by the second method (from the sale of swamp and overflowed lands) is uncertain and indefinite. The constitution of the State provides that twenty-five per cent of all the moneys received from the sale of public lands shall be turned into the school fund for the purpose of education. This leaves but three-fourths of the amount received for the purpose of drainage.

When the drainage work was commenced, the public had but little confidence in the success of the undertaking, and it was difficult to sell the land at any price. The Trustees, however, finally succeeded in selling about 700,000 acres at $1.25 to $2.00 per acre. When pending suits which had been brought against the Trustees to

restrain the collection of the drainage tax were dismissed, and a contract for the excavation of 184 miles of drainage canal was let to a responsible firm, the price of Everglade land advanced to $12.00 to $20.00 per acre, according to location. It then seemed that the Trustees would have no difficulty whatever in raising the money that would be needed to reclaim all the land in the drainage district. This, however, was not the case. Just when all the difficulties seemed to have been met and overcome, a powerful interest, both within and without the State, that was opposed to the drainage, set out to injure or destroy the project by circulating false and malicious reports concerning the character of the land and the efficiency of the work being done. The old adage—"a lie travels faster than the truth"— was more than verified in this instance. Within a very few months it was proclaimed throughout the country that the Everglades was nothing but worthless peat and the drainage was a failure. The effect of these false and pernicious reports created distrust in the minds of the public and impaired the demand for Everglade land. These unwarranted attacks have peojardized the resources of the Trustees, and will no doubt retard the completion of the drainage work.

Although a lie travels faster than the truth, it is not so enduring. In the course of a few years, these false statements concerning the Everglades will have been disproved and public confidence fully restored. It is a remarkable fact that practically all the derogatory statements relating to the character of the Ever-

glades and the plan of reclaiming them have been made by persons who have no personal knowledge of existing conditions. These criticisms are based on vague rumors and "hearsay evidence," that would not be accepted in any court of inquiry. These false and misleading statements, that have been so assiduously circulated, are the creatures of an inexcusable ignorance, or else they have been circulated with malicious intent or for personal gain.

Co-operation Necessary.

Experience in other States has convinced me that some form of co-operation among the several land owners must be secured before perfect drainage can be accomplished. No individual land owner, unless his land lies adjacent to one of the outlets, can drain his own land without affecting that of others. If the holdings in the Everglades were all in the State, or all in a single individual, it would be a simple matter to provide this lateral drainage, but with a diversified and widely distributed ownership it is a more difficult proposition.

Voluntary co-operation of all the land owners interested in a project of this kind is ideal, but not possible. Differences of opinion as to plans, distribution of cost, method of procedure and many other details will naturally arise to hinder and delay the work. Some legal instrument must be provided through which public sentiment, as expressed by a majority of the people interested, can be carried out.

To meet existing conditions, and make possi-

ble the complete reclamation of the Everglades, the ownership must practically all be controlled by some one person, or else the State Legislature must enact a General Drainage Law similar to those now in operation in many of the other States, under which the work can be carried out. Without some such provision, it will be difficult to complete the reclamation of the Everglades.

The intrinsic value of this land, in its present state, is not very great, but when drained it will become one of the most productive areas in the United States. The demand for good farm land is steadily increasing, while the supply becomes less and less each year. The writer remembers quite distinctly when the swamp lands in Indiana and Illinois were worth less than $5.00 per acre; the same lands are selling today at $100.00 to $200.00 per acre. This increase in value has been brought about by drainage, which made possible a natural growth and development of the country.

The holders of Everglade land should not be discouraged, but should unite in a common and persistent effort to complete the drainage as soon as possible and thereby reap the benefits of a substantial increase in price.

Transportation.

To any one owning land in the Everglades the facilities for easy access and transportation are of vital importance. It is generally conceded that water transportation is the cheapest method of handling freight, unless long distances

are to be covered and time becomes an essential element. When the necessary canals are completed, any part of the Everglades can be reached with shallow-draft boats and barges. Locks are to be constructed in the main canals at proper intervals to maintain a boating stage at all seasons of the year. This method of transportation has been found quite satisfactory in Holland and some parts of Germany. Through these canals the Florida East Coast Railway can be reached at Miami, Fort Lauderdale, Deerfield and West Palm Beach. This road is now building a branch from Maytown to Okeechobee City, on Taylor's Creek, four miles north of Lake Okeechobee. This will afford an additional outlet for products grown in the Everglades. The Atlantic Coast Line can be reached at Fort Myers via the Caloosahatchee River. There is a road projected across the Everglades from Tampa to Fort Lauderdale. This will no doubt be built as soon as there is a demand for it.

After the drainage is completed, and the land has had time to settle, highways can be built at a reasonable cost. The canal banks can be used for the road bed and the stone excavated from the canals for covering the surface.

The Survey of the Everglades.

The tract known as the Everglades has not been divided into townships and ranges and subdivided into sections. The high land on either side was surveyed many years ago by the Federal Government, but the work was not

extended into the open marsh because of its swampy condition.

Many maps have been published showing the township and range lines, and in many instances the sections and subdivision of sections, in the Everglades. These are all "Office Maps," made from data at hand and assumed, and not from an actual survey of the land. They give general information, but are not to be accepted as accurate.

The Trustees of the Internal Improvement Fund adopted a map June 10, 1907, dividing the Everglades into townships and ranges. This map was made by projecting on a plot the township and range lines on the north, east and west sides of the Everglades, and not from any survey of the land. This was designated an "official map," and land has been bought and sold by it. Each township was supposed to contain 36 sections of 640 acres each.

On October 29, 1910, the Trustees requested their Chief Drainage Engineer to prepare and submit a plan for surveying the Everglades. Instructions for making a survey in accordance with the official map above mentioned were prepared by the engineer and approved by the Board of Trustees December 29, 1910, and the work was commenced the following March. One party of surveyors was placed in the field on the east side of the Everglades and another on the west side. Although the field notes of the U. S. survey adjacent to the Everglades showed the townships to be exactly six miles wide, an actual measurement showed them to be greatly in excess of this width. Many of the corner posts

previously set by the Government were missing, and in many places no trace could be found on the ground to show that the lines had ever been run. This made it necessary to re-run many of the lines and re-locate the lost corners, at great expense to the State, as it required several months to do this work.

When the existence of this surplus was brought to the attention of the Trustees, and it was discovered that the sections in the Everglades, under the plan of subdivision adopted, would contain more than 640 acres each, they directed their Engineer to prepare another plan that would divide the territory into townships exactly six miles square, containing thirty-six sections of 640 acres each. In compliance with this order, a second plan was prepared and approved by the Trustees, in which it is proposed to make the several townships each six miles square, as nearly as may be, and containing thirty-six sections of 640 acres each. The surplus, instead of being distributed among the several townships, is disposed in large blocks, throughout the area. This is held by the State, and will be sub-divided into lots of a convenient size.

After adopting the second plan, it became necessary to re-locate several of the corners that had already been established. The survey is now being carried on in conformity with this modified plan. Permanent markers, consisting of a 1¼ -inch galvanized iron pipe, are driven through the muck into the underlying hard material and surmounted by a bronze cap, with a proper inscription to designate the loca-

tion. These markers are placed at the section corners.

Owing to the swampy condition of the land, this work was found to be both slow and expensive. There is not sufficient water for the use of boats for transporting supplies, and the ground is too soft for the use of horses or oxen. Along the margin of the Everglades, near the highland, supplies and subsistence were carried in on the shoulders of the laborers, but as the interior of the 'Glades was reached, the cost of this work became prohibitive. The time lost in moving camp and going to and from the work, was much more than that employed in running lines and setting corners.

The writer, who at that time was Chief Drainage Engineer, decided it would be necessary to abandon the survey until the drainage was completed, or else find some less expensive method of doing the work. After considering various expedients suggested, it was decided to build a tractor that would run in the Everglades, and transport the necessary supplies and furnish comfortable quarters for the men employed. Such a machine was designed and built and has proven eminently satisfactory.

This machine travels in the Everglades at the rate of two miles an hour, and carries 3,000 pounds, in addition to its own weight. A cook house and sleeping quarters are erected on the machine, so that no time is lost in going to and from the work. The corner markers and supplies are carried on it, thereby greatly reducing the number of men required in a party making the survey.

TRACTOR USED IN SURVEYING EVERGLADES.

The use of this machine makes possible the survey of the Everglades in its present condition at a reasonable cost. Six men with this tractor can accomplish twice as much work in a week as twelve men under the old method. It mashes down the vegetation, and makes a smooth surface on which to measure the distance, and furnishes an elevated platform from which to take observations with an instrument, thus making it possible to do much more accurate work than by the old method. With two of these tractors in use, the survey of the entire Everglades can be completed within a year, if the work is steadily prosecuted.

Healthfulness.

The writer has received hundreds of letters asking about the healthfulness of the Everglades. Swamp lands are usually unhealthful and malarious, but the Everglades seem to be an exception to the rule. There have been from 200 to 300 men from different sections of the country employed as engineers and surveyors, and workmen on the dredges for the past four years. These men have lived in the 'Glades, waded in the water, slept in wet clothing, eaten simple food, and in many instances drunk the water from the sloughs and ponds; and yet there has been practically no illness among them. I doubt if a more healthy lot of workmen can be found in any place than those employed in the Everglades. I attribute the healthfulness of this area to the fact that the water is not stagnant, and that the surface is swept at all times

with a salt breeze from the Gulf of Mexico or the Atlantic Ocean. No one need hesitate in purchasing land in the Everglades because of the unhealthfulness of the locality. With screened houses, pure water and wholesome food, as good health can be enjoyed here as in any place in the country.

Conclusion.

Like all new countries, the settlement of the Everglades will be attended with many failures and disappointments. Persons will settle here whose lives are not in harmony with rural conditions; they will become dissatisfied and move away, and their places will be filled by others better fitted for farm life.

I have studied the reclamation and settlement of the Everglades from all view points, and am fully convinced that within a score of years it will be one of the most productive areas in the United States.

PART TWO.

PART TWO.

THE ADAPTABILITY OF THE EVERGLADES FOR THE GROWTH OF SUGAR CANE.

Sugar Cane—Where Found.

IN order to determine the conditions under which sugar cane can be grown most advantageously we have but to study the soil and climatology of the localities in which it flourishes in a natural state, or in which it is most successfully cultivated.

Writers and travelers tell us that sugar cane is found in practically all the low moist lands in both hemispheres extending about thirty-five degrees both north and south of the equator. From this we see that its natural habitat is a warm climate, having a mean temperature ranging from seventy to ninety degrees, with an abundance of moisture and sunshine. It seems to thrive best in low lands swept by a moist sea breeze. For commercial use cane is most extensively grown in British India, Cuba, Java, Hawaii, Louisiana and Texas.

Climatic Conditions Necessary.

Although sugar cane is a tropical plant, it will withstand about 30 degrees F. for a few hours without serious injury, but it will not endure extreme or continued cold. In the countries where sugar cane is grown most success-

fully (without irrigation), the average annual rainfall is about sixty inches. In the sugar districts of Cuba it is 56 inches; in Porto Rico 77 inches, and in Louisiana 58 inches. Large crops of cane are grown in Guinea and other countries with a rainfall of upwards of 100 inches, but it remains green at maturity and is low in sugar content.

Where the annual average rainfall is much below sixty inches, as in the Hawaiian Islands, irrigation is necessary to produce a maximum yield. From careful experiments it has been ascertained that each ton of cane produced in Louisiana evaporates through its foliage about 150 tons of water. The only way in which the sugar content is extracted from the soil and deposited in the stalk is by the evaporation of water through the foliage. However fertile or rich in plant food the soil may be, it cannot yield a profitable crop of sugar cane unless the necessary amount of water is available at all times. Not only must the requisite quantity of water be provided, but it must be distributed throughout the season as required by the growth of the plant. Too much at one time and not enough at another is a serious detriment.

During the months of March, April and May, while the cane plant is small, it cannot evaporate as much water per day as during the months of June, July and August, when the stalks are large and the foliage more dense. In order that the cane may ripen properly and yield a large quantity of sugar, but little moisture is required in October and November. A

dry season is also advantageous during the winter months, while the cane is being cut and hauled out of the field, but a certain amount of moisture is necessary during these months to sprout the plant cane and keep the stubble in good condition. From these facts it appears that a dry winter, followed by a comparatively dry spring, then a wet, hot summer with a high degree of humidity, followed by a dry fall, are the ideal conditions for the growth of sugar cane, producing a large yield of sugar. In Hawaii and other places, where the annual rainfall is deficient, cane is most successfully grown by irrigation. This does not signify that the requirements or essential conditions cited above are in any way changed or modified; it simply means that the exact amount of water required by the cane is supplied as needed.

The average of fifteen tests made under identical conditions at the Hawaiian Experiment Station, giving the total amount of water received by two crops for the season of 1897 and 1898, 1898 and 1899 (a period of seventeen months each), is as follows:

Crop Period.	Rainfall.	Irrigation.	Water Per Acre.	Yield Sugar Per Acre.	Water Required to Produce 1 lb. of Sugar.
1897-98....	46.56	48.00	2,567.682	25.755	865
1898-99....	26.01	77.00	2,797.133	27.133	859

*The author states that no single rainfall exceeded one inch, and no more than one inch of water was applied at any single irrigation.

By withholding the water at the end of the growing season, where irrigation is practiced, the cane is ripened naturally and the sugar content is much greater than it otherwise would be. In fact, the ideal condition for growing any crop is that in which the grower is able to control the amount of moisture in the soil. When there is too much he must be able to promptly remove the excess; when there is too little to supply the deficiency. Where these conditions exist, or can be secured, a maximum crop may be produced each year with a degree of certainty that makes agriculture profitable.

Essentials for Profitable Cane Culture.

Dr. W. C. Stubbs, a recognized authority on sugar cane, says: "It may be asserted most positively that the conditions best suited to sugar cane are: (1) Fertile soil, (2) necessary conditions of temperature; (3) an abundant water supply, either naturally or through irrigation, so that it may be applied in ample quantities only when needed, and withheld when the cane has attained growth so that the process of maturation may take place." (See "Cultivation of Sugar Cane," by Wm. C. Stubbs, page 30).

Everglade Soil.

We will now examine briefly the natural features of the Everglades, and see to what extent the necessary conditions for the growth of sugar cane exists or can be readily secured.

The principal part of the Everglades lies be-

tween the 25th and 27th parallels of north latitude, being well in the limits of the sugar belt. The surface elevation ranges from six to twenty feet above sea level. The entire area is exposed to damp, moist winds, with a high degree of humidity during the summer months. There is an abundant supply of water for irrigation at all times. No intelligent agriculturist, who has ever examined the soil of the Everglades, questions its fertility. It is a bed of muck from two to fourteen feet deep underlain with a rotten limestone. A great many samples of soil from different parts of the Everglades have been analyzed by a number of competent chemists and the results obtained are practically the same throughout the entire area. Around the margin of the lake, and in other places where the land is driest, the muck is more thoroughly decomposed, and is in better condition for plant growth, but it possesses no elements of plant food not found in other parts of the Everglades.

Two representative samples taken from the interior west of Pompano, and examined for lime, potash and phosphoric acid and nitrogen by the Bureau of Soils, U. S. Department of Agriculture, Washington, D. C., show the following results:

TABLE OF ANALYSIS.

	Sample 1.	Sample 2.
Lime	2.25 per cent.	2.21 per cent.
Potash	.15 " "	.08 " "
Phosphoric acid	.19 " "	.19 " "
Nitrogen	3.16 " "	2.58 " "

From hundreds of samples of soil taken from various sections of the sugar district of Louis-

iana, Dr. Stubbs says the average analysis will be about as follows:

Lime	.50 per cent.
Potash	.40 per cent.
Phosphoric Acid	.10 per cent.
Nitrogen	.10 per cent.

Dr. Walter Maxwell, Director of the Experiment Station of Honolulu, gives the following mean result of nearly one hundred analyses from that locality:

TABLE OF DR. MAXWELL'S ANALYSES.

Island.	Lime Per Cent.	Potas Per Cent.	Phos. Acid Per Cent.	Nitrogen Per Cent.
Oahu	.38	.342	.207	.176
Kauai	.418	.309	.187	.227
Maui	.396	.357	.270	.388
Hawaii	.185	.346	.513	.540

These analyses are given to show the similarity of the soil in the Everglades to that of well-known sugar-producing sections. The writer does not believe that a soil analysis alone is conclusive proof of the productivity of any soil. Certain conditions of aeration and moisture are absolutely essential to render the plant food found in the soil available for the growth of the plant. In many places the yield of certain crops is materially increased by an application of potash or phosphoric acid, when an analysis of the soil shows the existence of a much larger quantity of these elements in the soil than is required for the growth and perfection of the crop being cultivated.

The old adage—"The proof of the pudding is in the eating"—is quite applicable in determin-

ing what a certain soil will produce. A real practical demonstration is a much safer guide than any laboratory analysis that can be made in determining whether a soil will or will not produce certain crops.

Although the Everglades as an entirety are not sufficiently drained for cultivation, there are certain limited areas partially drained where field demonstrations have been made. On the bank of Rita river, one mile south of Lake Okeechobee, sugar cane was grown quite successfully for a number of years with very little cultivation and without fertilizer of any kind. The writer inspected this patch of cane three different years and found a most remarkable growth. The stalks were large and heavy and yielded a profitable crop of syrup.

At the present time there is a patch of cane on the bank of south canal, five miles south of the lake, that was planted last April. This cane has made a good growth, and demonstrates conclusively the adaptability of the soil and climate for this crop. On the canal five miles from Miami is another field of cane, which I had photographed Nov. 15, 1912. (See plate X.) In this instance the saw grass was burned off the land, a furrow opened and the seed cane laid in and covered. I am informed this cane was not cultivated and no fertilizer of any kind was used. In the same locality the owner tells me he harvested forty tons of cane per acre last year.

On the Fellsmere Farms, near Sebastian, 80 miles north of the Everglades, they are grow-

ing sugar cane quite successfully. (See plate XII.)

On St. Cloud plantation, near Kissimmee, Fla., on land exactly like the Everglades so far as can be determined, as high as sixty-three tons of cane per acre was grown and manufactured into sugar, yielding 12,600 pounds per acre.

These demonstrations show most conclusively that the soil of the Everglades is suited to the growth of sugar cane. It is richer in lime and nitrogen than the cane lands in Louisiana and the Hawaiian Islands, and has about the same amount of phosphoric acid as these lands, but is slightly deficient in potash.

Temperature.

The conditions of temperature in the Everglades are about all that can be desired for the growth of sugar cane. The summers are long and hot, while the winter months have just enough cool weather to ripen the cane. Frosts are of rare occurrence, and when they do occur cause but little injury.

The following table gives the mean annual, highest and lowest temperature at Jupiter and Fort Myers, 1898-1906:

Year.	Jupiter.			Fort Myers.		
	Annual Mean Temperature.	Highest During the Year.	Lowest During the Year.	Annual Mean Temperature.	Highest During the Year.	Lowest During the Year.
1898	73.7	91	31	72.6	94	28
1899	74.4	93	28	73.1	93	28
1900	74.3	93	31	72.3	92	34
1901	72.6	92	38	70.3	94	32
1902	74.4	96	38	72.2	94	31
1903	74.1	96	36	71.8	94	35
1904	73.8	94	39	....	94	34
1905	74.6	94	24	73.5	94	27
1906	73.7	91	30	72.4	92	31

These stations are both north of the body of the Everglades, and, no doubt, show from three to four degrees lower temperature than would be registered south of Lake Okeechobee.

The following table gives the mean annual, highest and lowest temperature at the sugar experiment station at New Orleans, La., for ten years, 1888-1896:

TEMPERATURE—SUGAR EXPERIMENT STATION—NEW ORLEANS, LOUISIANA.

Year.	Mean Annual Temperature.	Highest. During Year.	Lowest. During Year.
1887	70.3	99	72
1888	70.2	98	27
1889	70.1	96	30
1890	69.98	95	32
1891	68.20	98	29
1892	67.70	99	21
1893	68.40	99	28
1894	68.05	99	19
1895	68.43	98	15
1896	68.76	98	24

An inspection of these tables shows that the mean annual, and also the minimum, temperature is higher in the Everglades than in the sugar district of Louisiana. Cold waves are not so frequent and are of shorter duration. On account of this immunity from cold, sugar cane in the Everglades has a longer season in which to grow and ripen than in Louisiana and is consequently much richer in sucrose. In Louisiana the grinding season commences about the third week in October and is completed on most plantations by December 31. This is necessary in order to save the crop before the cold weather, which usually comes in January or February. This short period in which the crop must be handled entails a great loss to the sugar planter.

When the grinding season commences the cane is immature, and the yield of sugar per ton is much less than after the first of December, when the cane is fully ripe. On the other hand, if the grinding is not finished before a severe freeze comes, a much greater loss is sustained.

This drawback will not be encountered in the Everglades. The harvesting need not commence until December, giving the cane ample time to mature, and it can continue without loss until March or April. This advantage alone represents a handsome profit in favor of the cane grower in the Everglades.

Rainfall and Water Supply.

The next essential to be considered is that of precipitation and water supply. On this condition depends largely the success or failure of

sugar cane culture in any country. Sugar cane cannot be grown successfully, and manufactured at a profit, unless the proper quantity of water is supplied to the cane at the right time. If this cannot be provided naturally it must be supplied artificially. If there is too much rain at one period adequate provision must be made by drainage to remove the excess promptly. If there is likely to be a deficiency at any season of the year, provision must be made to supply it by irrigation.

The following tables show the monthly distribution of the rainfall at Jupiter, Kissimmee and Fort Myers. These are the nearest points to the Everglades at which reliable records have been kept for any length of time, and, no doubt, represent fairly well the rainfall in the northern part of the Everglades:

MONTHLY PRECIPITATION.

TABLE NO. 1—JUPITER.

	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average Monthly
March	3.26	3.58	8.20	2.30	.97	9.27	3.06	5.39	2.50	4.17
April	1.90	3.11	2.16	2.13	.97	.44	2.85	3.14	2.57	2.14
May	1.15	1.65	7.43	3.63	4.83	2.71	2.42	3.35	7.04	3.80
Total	6.31	8.34	17.79	8.06	6.77	12.42	8.33	11.88	12.11	.
June	.12	3.45	2.90	17.41	3.92	7.01	10.54	2.08	11.90	6.59
July	6.80	3.35	3.49	7.23	4.73	3.23	4.38	9.12	7.97	5.59
August	6.62	5.96	1.12	12.13	1.91	2.47	5.79	10.72	8.55	6.14
Total	13.54	12.76	7.51	36.77	10.56	12.71	20.71	21.92	28.42	.
September	3.38	11.27	7.62	9.71	6.01	15.82	8.92	10.77	8.37	9.09
October	10.89	16.66	10.11	7.08	13.74	1.81	21.49	4.26	8.31	9.37
November	1.11	.99	.73	.94	2.38	2.50	3.98	2.88	4.53	2.22
Total	15.38	28.92	18.46	17.73	22.13	20.13	34.39	17.91	21.21	
December	2.56	2.97	3.10	4.17	.71	.56	.49	15.18	.05	2.30
January	.36	4.30	3.49	8.29	.98	6.98	2.56	1.40	2.62	3.44
February	.95	4.64	2.28	1.07	4.64	4.50	2.20	1.50	6.44	3.40
Total	3.87	11.91	8.87	13.53	6.33	12.04	5.25	18.08	9.11	
Total annual	39.10	61.93	52.63	76.09	45.79	57.30	68.68	69.79	70.85	

MONTHLY PRECIPITATION.

TABLE 2—KISSIMMEE.

	1898.	18.99	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average Monthly.
March	.00	1.68	6.07	3.51	1.88	5.84	.80	3.88	2.74	2.93
April	.12	3.06	3.02	3.23	1.73	.25	2.25	1.82	1.48	1.88
May	.35	1.60	5.84	2.96	.34	6.68	.51	7.17	6.77	3.58
Total	.47	6.34	14.93	9.70	3.95	12.77	3.56	12.87	10.99	
June	5.75	3.06	8.18	8.78	5.85	10.12	8.19	4.46	10.21	7.17
July	7.90	8.37	5.66	2.84	5.36	6.07	8.56	14.05	6.65	7.27
August	11.41	11.06	3.23	9.91	7.27	4.31	4.53	13.90	2.59	7.57
Total	25.06	22.49	17.07	21.53	18.48	20.50	21.28	32.41	19.45	
September	4.52	7.03	4.50	12.95	3.35	12.06	4.66	5.05	3.26	6.70
October	5.17	15.98	4.83	1.18	3.07	1.02	6.72	3.19	2.00	4.79
November	.88	.23	1.62	.67	1.15	3.56	3.15	.00	.16	1.26
Total	10.57	23.24	10.95	14.80	10.57	16.64	14.53	8.23	5.42	
December	3.02	1.60	5.09	1.35	.98	1.51	.80	9.43	.04	2.64
January	.23	5.72	4.88	.92	.19	4.76	4.16	.70	6.43	3.10
February	1.12	11.53	2.65	2.26	6.07	5.04	5.16	.91	1.49	4.02
Total	4.37	18.85	12.56	4.53	7.22	11.31	10.12	11.04	7.96	
Total Annual	40.47	70.92	55.51	50.56	40.22	61.22	49.49	64.55	43.82	

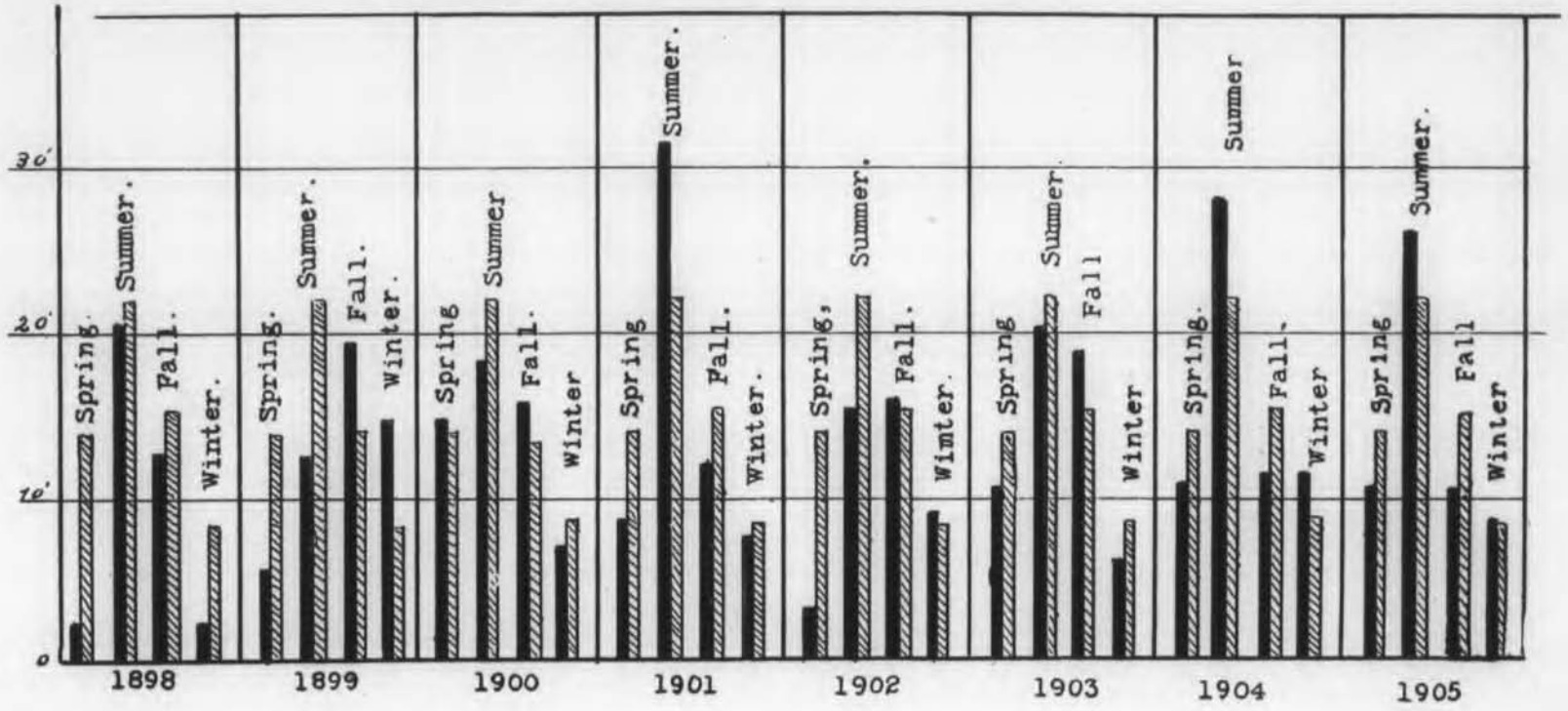
MONTHLY PRECIPITATION.

TABLE NO. 3—FORT MYERS.

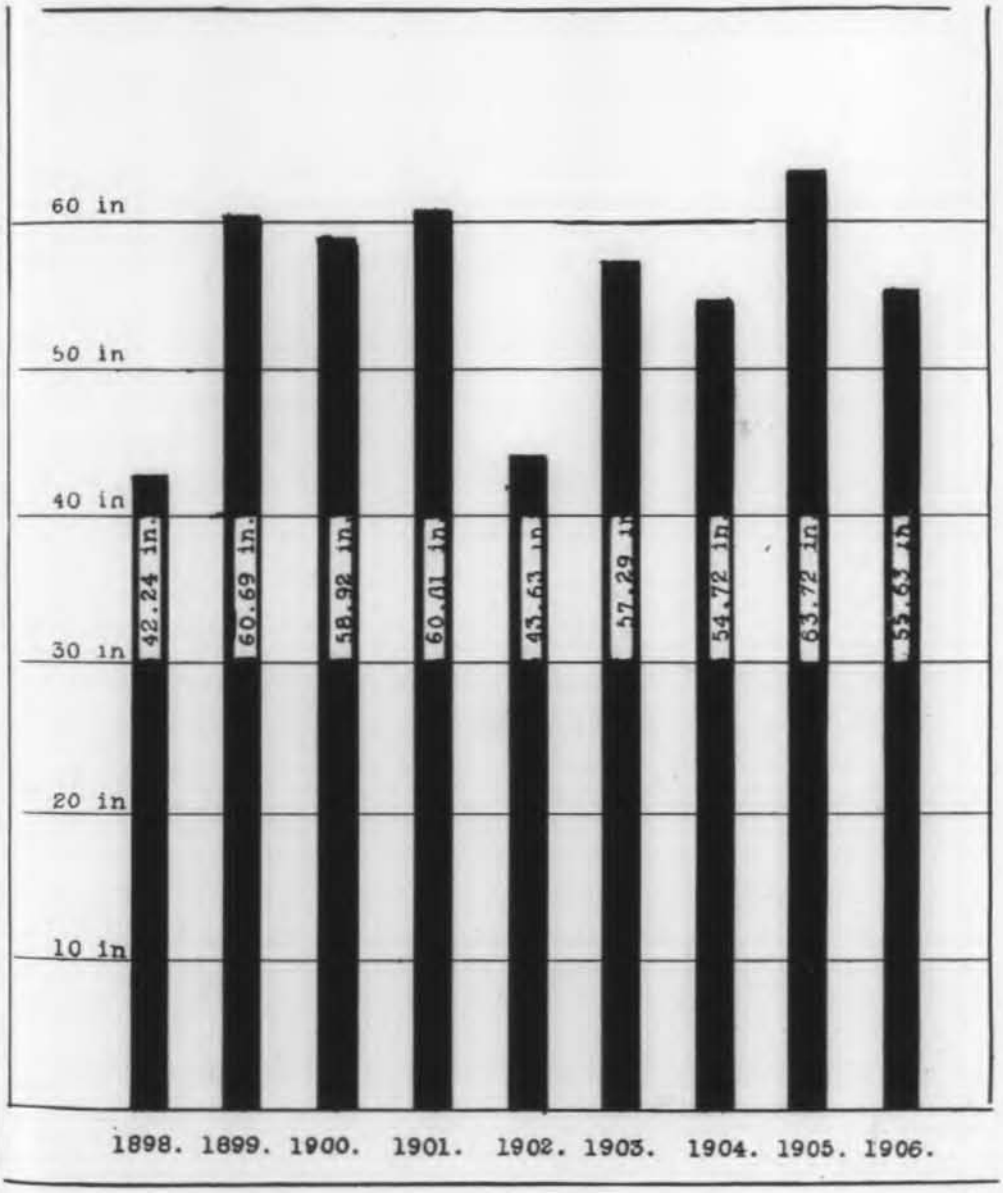
	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average Monthly.
March	.46	1.23	4.12	2.67	.18	7.78	1.90	.18	2.84	2.35
April	.37	1.74	2.87	1.89	1.03	.00	1.10	4.83	.21	1.56
May	3.53	1.15	4.65	2.30	1.23	.71	3.57	3.97	6.12	3.02
Total	4.36	4.12	11.64	6.86	2.44	8.49	6.57	8.98	9.17	
June	2.83	5.93	7.12	20.28	8.63	10.45	14.86	5.97	11.00	9.67
July	8.16	12.08	9.63	5.23	4.60	11.40	5.60	13.90	9.69	7.81
August	11.62	6.72	9.77	12.41	3.97	5.50	6.30	10.52	12.02	8.75
Total	22.62	27.43	26.52	37.92	17.20	27.35	26.76	30.39	32.71	
September	10.73	2.31	8.29	6.86	6.60	4.15	3.07	9.09	3.39	6.05
October	4.99	2.58	10.33	.78	7.46	1.62	1.78	1.51	2.41	3.81
November	1.29	.94	1.91	.52	.96	2.02	1.93	.06	.32	1.10
Total	17.01	5.83	20.53	8.16	15.02	7.79	6.78	10.66	6.12	
December	3.12	.58	2.78	1.62	2.93	1.69	.83	6.31	.02	2.20
January	.05	5.21	3.17	.50	.52	4.76	3.12	.50	2.02	2.20
February	.02	8.77	3.99	.72	6.79	3.37	2.00	.10	2.18	3.10
Total	3.19	14.56	9.94	2.84	10.24	9.74	5.95	6.91	4.22	
Total annual	47.17	49.24	68.63	55.78	44.90	53.37	46.00	56.84	52.22	

DIAGRAM SHOWING MEAN SEASONABLE DISTRIBUTION OF RAINFALL
AT
JUPITER KISSIMMEE AND FORT MYERS

Explanation The solid line indicates the actual rainfall during each season
The shaded line indicates approximately the amount of water
required for maximum growth of cane crop



AVERAGE OF ANNUAL RAINFALL
AT
JUPITER KISSIMMEE AND FORT MYERS



The accompanying diagrams show in graphic form the average of the annual rainfalls at Jupiter, Kissimmee and Fort Myers, and also the seasonable distribution of the same for nine years. In the absence of actual gaugings of the rainfall in the Everglades, covering a period of several years, these diagrams may be accepted as the most reliable data available on the subject:

From a careful inspection of the foregoing tables and diagrams the following conclusions are reached:

1. In five of the nine years reported the total rainfall, if properly distributed, was sufficient to produce a good cane crop.

2. In four of the nine years reported the total rainfall was not sufficient to meet the requirements for a maximum cane crop.

3. In four of the nine years the monthly distribution of the rainfall conformed quite closely to the quantities required by the growing cane.

4. In five of the nine years the distribution was quite irregular, there being a large **excess** in some months and a **deficiency in others.**

6. During the fall months there is too much rain for the proper ripening of the cane and a good yield of sugar.

In studying the climate of the sugar-producing countries in no place is found a uniform distribution of the rainfall throughout a series of years, and in no place do they grow a maximum crop of cane each year. In Louisiana the rainfall during the spring months ranges from 6.42 to 20.4 inches; in the summer months from

13.49 to 29.98; in the fall months from 3.71 to 20.39; in the winter months from 4.53 to 21.36.

In Porto Rico the rainfall during the spring months ranges from 1.13 to 13.78; in the summer months from 3.92 to 16.12; in the fall from 5.13 to 13.90; in the winter from .51 to 8.11.

In the Everglades it ranges from 3.4 to 11.2 inches in the spring months; from 15 to 30 inches in the summer; from 10.6 to 19 inches in the fall; and from 3.5 to 15 inches in the winter.

Advantageous Features of the Everglades.

The amount and distribution of the rainfall cannot be controlled by human agency. In some months there will be too much rain, and in some too little for the best growth of sugar cane. With the overflow from Lake Okeechobee cut off, and the outlet canals (seven to ten feet deep) completed, practically all the land in the Everglades can be properly drained by the digging of sufficient lateral ditches. Just how close together and how deep these ditches should be to properly drain the land for the cultivation of sugar cane will depend largely upon the methods of cultivation and the degree of risk, from too much rainfall, the proprietor is willing to assume.

Although sugar cane is a water-loving plant, any amount of rainfall in excess of that required by the plant must be promptly removed or it works an injury. This can be done only by providing adequate drainage. The field ditches must be of sufficient capacity to remove promptly the heaviest rainfall that is likely to occur.

Cane growers, as a rule, do not appreciate this fact. They plant land that is imperfectly drained with a hope that heavy rains may never come. The result is the crop is often damaged and the financial loss in a single year greater than the cost of proper ditching.

Opinion of Dr. Stubbs.

On the importance of drainage for sugarcane I desire to quote at length from the "Cultivation of Sugar Cane," by William C. Stubbs, Part I, page 39:

"Nowhere on earth is drainage more essential than in the alluvial districts of Louisiana, and while many plantations may be considered well drained, the average planter has not yet fully appreciated the necessity for multiplying open ditches to the extent of forcing his soils to their fullest capacity. This is evidenced by a trip over the State and observing the varying distances between ditches which obtain in different plantations.

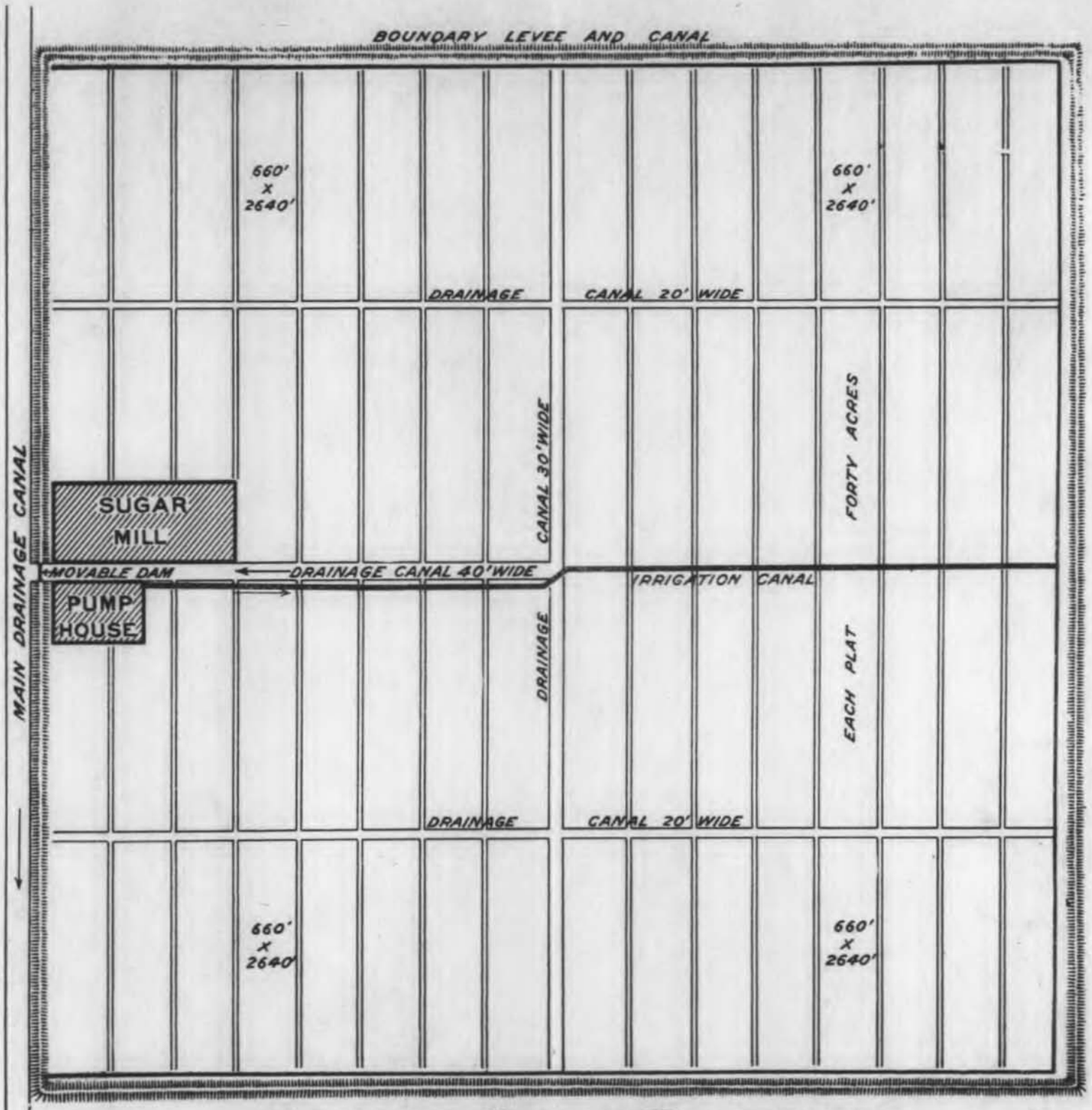
"Only in very dry seasons can badly drained lands be made to yield large crops. Since these unfortunately occur only at long intervals, the average yield on such lands is far below their natural capacity. On badly drained lands neither fertilizer nor cultivation have their full effects, hence the discordant opinions which frequenty prevail among our planters from the use of the same fertilizer or the same method of cultivation. From the experiences of this station it is almost impossible to be 'over-drained,' providing the work of draining be intelligently

performed. It is well for every planter to study his system of drainage and examine his ditches, and see if they be deep enough, wide enough and sufficiently abundant to carry off our heaviest rainfalls and retain the 'bottom or ground water' at a constant depth below the surface. Excellent results can be obtained with open ditches, provided they are numerous, deep and wide. In the lower sugar district these ditches should be at least as close as 100 to 125 feet, and deep enough to hold the bottom water at least three feet below the surface."

Drainage in the Everglades.

The rainfall is just as heavy in the Everglades as in Louisiana, and because of this field ditches are absolutely necessary; but the muck soil of the Everglades is more porous than the alluvial soil of the sugar lands of Louisiana, and for this reason field ditches need not be so close together.

There is much speculation and difference of opinion as to the proper distance apart, and size and depth of field ditches required, for perfect drainage in the Everglades. While the land is new and the soil porous I believe that field ditches with free outlets 660 feet apart will afford good drainage for the cultivation of sugar cane. When the land has been cultivated a number of years it will become more compact and the ditches will need to be closer together, probably 330 feet apart for good drainage. These ditches should be at least four feet deep and not less than three feet wide on the bottom. The plot between the lateral ditches should



PLAN OF SUGAR PLANTATION

Showing System of Drainage and Irrigation Canals

have frequent shallow surface ditches (called in Louisiana **quarter drains)** to lead the surface water, when the ground is saturated, into the lateral ditches. These should not be deep enough to interfere with cultivation.

Without a complete system of lateral ditches the growing of sugar cane in the Everglades will be a hazardous business. There are times when there is too much rainfall for it to be taken up by free evaporation from the soil and by the growing crops. This surplus must be promptly removed by proper drainage, or the crop will be impaired. This is particularly necessary in the late fall, when the cane begins to ripen. Unless the land is thoroughly drained at this time the cane will remain green and the sugar content will be small.

A perfect arrangement for controlling the supply of water can be secured by placing movable dams in the canals on the sugar plantation to cut off the supply from the main arteries and installing a pumping plant of sufficient capacity to empty the canals on the plantation when desirable to do so. By this method the plane of soil water can be reduced to any level desired. Such a system will provide perfect drainage at all times, thereby insuring the planter against adverse weather conditions.

This same pumping plant can be used to raise the water for irrigation when there there is a low stage in the drainage canals. The water can be distributed over the land in shallow ditches and let into the furrows between the cane rows and drawn off through the drainage canals, or the dams can be closed and the ca-

nals filled to the proper stage to water the crop by sub-irrigation.

Because of the low lift and the abundant supply of water at hand the cost of irrigation will be less in the Everglades than in any other sugar-producing district in the world.

Since sugar cane is a crop of high commercial value—$90.00 to $150.00 per acre—no pains should be spared to prepare the land in such a way as to produce a full crop each year. The grower cannot afford to assume any risk that can be provided against by irrigation and drainage.

Dual Use of Canals.

In planning a system of drains for a sugar plantation in the Everglades the use of the canals for transportation purposes must be given due consideration. The distribution of seed cane at planting, and the hauling of cane from the field to the sugar mill, are important items.

In Louisiana the cane is usually handled from the field to the sugar house in cars, holding from three to seven tons, drawn on a tram road by a small locomotive. This work can be done at much less cost in the Everglades by means of canals and barges.

One mile of tram road, with good ties and thirty-pound steel rails, will cost at least $2,500.00 per mile without the equipment for operating same. A canal twenty feet wide and seven and one-half feet deep will cost about $1,765.00 per mile. The barges and launches necessary to handle 1,200 tons of cane per day

will cost much less than an equipment of cars and locomotives for the same service. In addition to handling the cane, the barges can be used to haul the finished product to the shipping point, while locomotives and cars cannot, without the building of a road for that purpose.

METHODS TO BE EMPLOYED AND COST OF PREPARING THE LAND.—PLANTING AND CULTIVATING SUGAR CANE IN THE EVERGLADES.

Condition of the Land.

Practically all the land in the Everglades is free from trees and bushes, so there is no expense to be incurred for clearing and grubbing. The saw grass can be burned off, leaving nothing on the ground but a coarse stubble. This burning destroys the seeds of any grasses or weeds, making the cultivation the first year quite easy. The land is too soft, at the present time, to admit of the use of animal power for plowing and cultivating. When it is drained and put in cultivation it will become more compact each year, and in a few years will be firm enough to be cultivated in the usual manner. In Louisiana this work is done with the best mules that can be secured, the initial cost and maintenance of which is a large item of expense. In Cuba, oxen are largely used as the motive power on the sugar plantation.

A Tractor as Power.

A form of tractor for use on soft ground is now being built by a number of manufacturers. It is used in the same manner as an ordinary traction engine, and moves readily over ground too soft to carry the weight of a horse or an ox. These tractors have been thoroughly tried out in the Everglades and are a decided success. They are also successfully used for plowing swamp lands in southern Louisiana and in the cultivation of sugar beets in the Western States. Where the land is practically level and free from obstructions, it can be broken and cultivated much cheaper by a steam or gasoline plow than by animal power.

On a large plantation the initial cost of the required number of tractors and gang plows is but little, if any, greater than the cost of the necessary mules and implements to do the same work. The cost of fuel to operate a tractor is much less than the cost of feed for the animals that would be required to do the same work. The cost of the labor to operate a tractor and gang plows is much less than the cost of the labor necessary to cultivate the same land with animal power.

During that portion of the year when the tractor is not in use it requires no attention or expense, while mules must be cared for and fed, whether idle or at work. Where a large number of animals are employed on a plantation, the loss from accident and disease is a large item—much greater than the depreciation of a mechanical equipment.

PLOWING WITH A TRACTOR.

With a machine of this type the raw land in the Everglades can be prepared and planted, at a less cost per acre, than by the methods now in vogue in Cuba, Louisiana or the Hawaiian Islands. One of these tractors will travel at the rate of two miles per hour and will plow a strip one-half rod wide as fast as it moves. At this rate it will plow twenty acres per day of ten hours at a cost for labor and gasoline of twenty dollars per day, or a unit cost of one dollar per acre. The same tractor can be used for harrowing the ground and opening the furrows to receive the seed cane.

Seed Cane.

For planting any large area in the Everglades for the first time, seed cane will have to be secured from the cultivated lands in Florida and brought to Fort Myers or Fort Lauderdale by rail or on barges. Here it can be transferred to small barges and delivered to the plantation through the drainage canals. This seed cane, delivered at the plantation, will probably cost six dollars per ton.

In common practice four or four and a half tons of seed cane are required to plant one acre. Since the seed cane for planting in the Everglades must be brought a long distance, there is a possibility that many of the eyes or buds will be injured and that some will not sprout. For these reasons it will be prudent to plant at least five tons of seed per acre to insure a good stand.

Method of Handling.

In order to distribute the seed cane economically in the field, and for the purpose of harvesting the crop, a quantity of portable track in sections of fifteen feet each, made of fifteen-pound "T" rails, and a supply of cane cars, holding two or three tons each, will be required. With this equipment cane can be distributed and planted quickly and cheaply with a minimum of laborers. The cane can also be distributed over the field very economically by means of the tractor used for plowing the land.

Seed cane is usually planted by opening a furrow with a double mould-board plow, and laying the stalks about two to the running foot in the furrow and covering by hand, or with a disc-plow. In some localities, the stalks are cut into short pieces, but this is not necessary unless they are very crooked.

Cane may be planted in the Everglades any time from October to April. Where a large plantation is being established, it will be more economical to purchase seed, and plant about fifteen per cent. of the area the first year, and then use this crop for seeding the remainder of the plantation. After a few years, when the stubble cane begins to deteriorate, about twenty per cent. of the plantation should be replanted each year.

Cultivation.

The cultivation of sugar cane in the Everglades will be light work. After the saw grass

SUGAR CANE ON MIAMI CANAL.

is burned, and the land broken, there will be no weed and grass seeds left on the soil, to germinate and spring up the first year. The soil is loose and finely pulverized, and will not bake, and become compacted, so as to break up in clods. The cultivation can be done largely with the tractor, and some form of disc or gang plow. But little hand labor will be required. The land is free from those fine grasses, like nut grass and Johnson grass, that are so hard to destroy. The most common vegetation, after the first year, is coarse weeds, that grow rapidly and are easily killed.

Care of Ditches.

Since complete and perfect drainage is the key to success in cane culture, the ditches must be kept at all times in good order. The cane rows will run parallel with the field ditches, and the furrows between the rows will collect the surface water in times of heavy rains. Provision must be made for leading the water from these furrows into the side drains. This can be done by shallow furrows or surface ditches, across the plot, at frequent intervals. These need not be deep enough to interfere with the cultivation, but must be kept open at all times.

Commercial Fertilizer.

It is the opinion of the writer that no commercial fertilizer will be required on this land. Experience will, however, finally determine the matter.

Harvesting.

Cutting, stripping and delivering the cane to the sugar mill is an arduous task on a sugar plantation. When one considers there may be thirty to forty tons of cane per acre; that it may be badly blown down and tangled; that each stalk must be cut separately; the heavy cost of harvesting becomes apparent. Each sugar-producing country has its own method (best suited to its conditions) for doing this work. In the Everglades I think the method best suited will be similar to that used in Louisiana. Each stalk of cane will be cut by hand flush with the ground, stripped of its leaves and topped at the proper joint. Three or four rows may be thrown together in small piles, of 100 to 200 stalks. These piles can be gathered by hand labor and placed in cane cars on a portable track alongside the piles of cane. These cars can be handled by a hoisting engine and a wire rope, leading to barges holding forty to sixty tons in the collecting canals. The cars can be unloaded by means of a derrick and grapple. It will probably cost a little more per ton to handle cane in the Everglades than it does in Louisiana, where the ground is firm enough to use mechanical cane loaders and carts.

Life of Sugar Cane.

In Louisiana they have found, from experience, that it is necessary to dig up the stubble, every two or three years and re-plant the field to maintain a good crop and a profitable yield.

In Cuba, owing to the mild climate, cane grows six to ten years without re-planting. In the Everglades it will probably produce a good yield six to eight years from one planting. This saving, in seed cane and labor is a very important item.

Cost of Growing Cane.

In the absence of actual experience, I think the following may be taken as a conservative estimate of the cost of preparing the land, cost of seed cane, planting, cultivating and harvesting, first and second years cane crop in the Everglades. After the first year, the cost of preparing the land and the cost of seed cane will be largely eliminated, as the cane will continue to reproduce from the rattoons for a number of years. The cultivation after the first year will be more expensive, as some hand labor will be required, while the plant is young and tender:

ESTIMATED COST OF GROWING SUGAR CANE ON A LARGE PLANTATION IN THE EVERGLADES.

STATEMENT FIRST YEAR.

Breaking land with tractor and gang plows..	$ 1.00	per	acre
Pulverizing and bedding with tractor.....	1.50	"	"
Seed cane, 5 tons at 6.00 per ton.....	30.00	"	"
Distributing and planting seed cane.....	5.00	"	"
Three cultivations with tractor and gangs..	3.00	"	"
One cultivation with hand tools.....	2.00	"	"
Care of ditches and quarter drains.....	.50	"	"
Total cost of production.....	$43.00	"	"
Conservative yield 35 tons per acre:			
Cutting, stripping and loading at 80 cents per ton..	$28.00		
Total cost of crop.....	$71.00		

Value of 35 tons at $3.00 per ton	$105.00
Less cost of production	71.00
Net profit first year	$ 34.00

STATEMENT SECOND YEAR.

Off-barring and scraping stubble	$ 3.00	per acre
Five cultivations with tractor	5.00	" "
One cultivation with hand tools	2.00	" "
Care of ditches and quarter drains	1.00	" "
Total cost of production	$11.00	

Conservative yield 35 tons per acre.

Cutting, stripping and loading:		
Thirty-five tons at 80 cents per ton	$ 28.00	per acre
Total cost of crop	$ 39.00	" "
Value of thirty-five tons at $3.00 per ton	$105.00	
Less cost of production	39.00	
Net profit second year	$ 66.00	

For the third and subsequent years the cost of production will be about the same as that for the second year.

In the foregoing estimate of the cost of growing cane in the Everglades no account has been taken of interest on investment on the depreciation of the equipment required for running the plantation. The figures are intended merely to show the probable cost of growing sugar cane under favorable conditions and delivering it to a central factory.

The personal supervision and degree of intelligence exercised in the management of any business has much to do with the cost of operation. This is particularly true of farming. Judgment in preparing the land, selecting the seed and methods of cultivation often have more to do with the harvest than the character

of the land. Some planters have grown rich in Louisiana growing cane, while others have failed on similar land. The same thing is likely to happen in the Everglades. Unless the land is properly drained and advanced methods of cultivation employed the crop undertaken is likely to be failure, and sugar cane will be no exception to the rule.

From the small patches of cane, I have observed growing around the margin of the Everglades and throughout South Florida, I am fully convinced that with proper methods of culture enormous yields can be secured. In the estimate given, thirty-five tons per acre were taken as a probable yield. This I regard as very conservative. If the soil is put in proper tilth and a good stand of cane is secured and irrigation practiced when needed, I see no reason why the yield may not be forty-five to fifty tons per acre.

I have secured from a reliable source the cost of growing cane by one of the most successful planters in Louisiana, which is as follows.

Preparation of the land	$ 1.80	per	acre
Fertilizer and applying same	6.30	"	"
Cane for seed	15.00	"	"
Planting seed cane	6.00	"	"
Cultivation	9.35	"	"
Total cost of first year's crop	$ 38.45	"	"

In Louisiana the land is re-seeded once in two years, the rotation being: First year, plant cane; second year, stubble cane; third year, corn and cowpeas. The yield of plant cane will

average twenty-five to thirty tons per acre; stubble cane, eighteen to twenty-two tons per acre. The cost of cutting, stripping and hauling cane, under favorable conditions, is estimated at 70 cents per ton. It requires two good mules to properly cultivate twenty acres of cane.

The Cuban Department of Agriculture has issued a bulletin, dated March 9, 1912, in which is given the following data as to the cost of growing cane in Cuba:

Preparation of land	$10.45	to	$22.10	per	acre
Cost of planting (including seed)	10.50	to	13.80	"	"
Cost of cultivation	10.55	to	12.60	"	"
Total cost of production	$31.50	to	$48.50	"	"

The cost of hauling and delivering to the mill is given as follows

Cutting and loading	$12.75	to	$18.00	per	acre
Hauling to mill	9.00	to	18.00	"	"
Total harvesting	$21.75	to	$36.00	"	"

This bulletin says: "Good land in Cuba often yields thirty to thirty-five tons of cane per acre. If irrigation is available, and intense cultivation is employed, it is possible to raise the production to fifty to sixty tons per acre."

Marketing and Manufacturing.

After a cane crop is grown it must be marketed in the field or converted into syrup or sugar. Throughout Florida and Georgia, where small areas of cane are grown, it is

A MODERN SUGAR FACTORY.

usually ground in a small mill in the neighborhood and converted into syrup.

In Louisiana, before the war, most of the cane grown was ground on the plantation and made into yellow sugar. Experience has demonstrated this practice is wasteful. A small mill, costing but a few hundred dollars, will extract from forty to sixty per cent. of the juice from the cane, while a heavy, modern mill will extract ninety to ninety-six per cent. at a much less cost per ton of cane ground. Improved methods of converting the juice into sugar are too expensive to install in a small factory. It is also much more profitable to manufacture a high grade of sugar than cheap sugar or syrup. Because of these facts practically all the cane grown in Louisiana, Cuba and the Hawaiian Islands is now ground at Central Factories and made into a high grade of sugar.

Where a plantation is large enough to justify the initial cost, it builds and operates its own factory for grinding the cane grown on the place. For the accommodation of the numerous small planters in a given section, central factories are built, which purchase the cane, within reach, at a fixed price per ton, direct from the grower. In this way the planter gets a fair price for his cane, and the manufacturer makes a profit because of the efficiency and superior advantages of his factory. In most places the price paid per ton for cane is determined each week, by the market price of sugar and the per cent of sucrose in the cane that week. A similar arrangement can be made in the Everglades. To encourage cane growing a large plan-

tation—2,000 to 4,000 acres in cultivation—should be established to furnish seed cane to small planters and provide a reasonable supply of cane for the factory throughout the grinding season.

The sugar mill should have ample capacity to grind all the cane raised on the plantation, and also be able to purchase and grind all the cane raised on the smaller farms near by. Such an arrangement will make it possible for the owners of small tracts to grow sugar cane as a profitable staple crop.

Although sugar cane may not yield as large a return per acre as some vegetables that are now grown, it is practically a sure crop. Where the conditions are at all favorable a total failure of a cane crop is unknown. With adequate provisions for controlling the water the growing of sugar cane in the Everglades is less hazardous than any other branch of agriculture. It is probably more free from disease than any other staple crop produced in the Uinted States. It requires no special skill in planting and cultivation; it can be harvested any time from December to May; it will produce a profitable crop for five to eight years without replanting. In fact, sugar cane is the ideal staple crop to be grown in the Everglades.

Supply and Consumption.

There is no probability that the supply of sugar produced in the United States will ever exceed the demand for home consumption. The

SUGAR CANE ON FELLSMERE FARMS.

annual consumption of sugar per capita in this country is steadily increasing. In 1870 it was 32.7 pounds; in 1880, 39.5 pounds; in 1890, 50.7 pounds; in 1900, 58.9 pounds, and in 1910, 79.9 pounds.

The total consumption in the United States, in 1910 (according to the report of Willett & Gray) was 3,405,204 tons. Of this amount (including both cane and beet sugar) 824,574 tons, or less than one-fourth, was produced in the United States. The deficiency was supplied by importing from Hawaii 489,974 tons; from Porto Rico 285,128 tons; from the Philippines 171,-112 tons; making a total of 946,214 tons from our insular possessions, on which no duty was collected. We imported 1,431,888 tons from Cuba, with twenty per cent reduction from the full tariff rates. From other countries were imported 202,536 tons, at full tariff rates, making the total importation for the year 2,580,630 tons. This enormous importation should be produced in the United States. It would require only about 800,000 acres of the best Everglade land, if properly cultivated, to supply this deficiency.

Value to the State.

There are at least 2,000,000 acres of land in the Everglades and adjacent thereto that are especially adapted to the growth of sugar cane. Most of this land is now non-productive, yielding no revenue either to its owner or to the State.

This land can be cleared and prepared for

planting at a cost of $8.00 to $20.00 per acre. If this were done, and the land planted in sugar cane and properly cultivated, the average yield would not likely be less than thirty tons per acre. Many persons who have studied the subject, place the yield much higher—forty to fifty tons per acre.

With an average of thirty tons per acre, the yield from this area would be 60,000,000 tons of cane per annum, which, at $3.00 per ton (a very low price), would amount to the enormous sum of $180,000,000.00 per year This is almost as much as the assessed value of all the property in the State at the present time. It is more than twenty times the value of the largest citrus crop ever grown in the State.

These figures may seem incredible, yet they are susceptible of actual demonstration and proof. There are numerous small patches of cane now growing in South Florida, under adverse conditions, that will make more than thirty tons per acre. It is easy for any one interested to prove this statement, by selecting a small area, measuring the ground, and weighing the cane. In December or January, when the cane is mature, samples can be selected and analyzed, and the actual sugar content definitely ascertained. This will be found to be worth more than three dollars per ton, after deducting a reasonable price for grinding and manufacturing. Such an examination and test can be readily made, and it is worth a great deal more, in determining the value and possibilities of Everglade land, than the opinion of

any expert agriculturist or soil physicist, in the country.

When this land shall have been reclaimed, and utilized for the production of sugar, South Florida will no longer be spoken of as the "rich man's winter playground," but it will actually become the greatest wealth-producing section of the United States.

T. J. APPLEYARD, STATE PRINTER,
TALLAHASSEE, FLA.